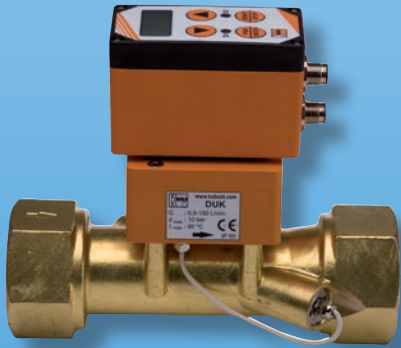


# Compact Ultrasonic Flowmeter



measuring  
•  
monitoring  
•  
analyzing

DUK



- Measuring Ranges:  
0.02...5 GPM to 0.6...160 GPM
- Accuracy:  $\pm 0.7\%$  of Reading +  $\pm 0.7\%$  of F.S.
- Turndown Ratio: 250:1
- $P_{\max}$ : 230 PSI;  $T_{\max}$ : 248° F
- Connections: 1/2" ...3" NPT or G Thread
- Material: Brass or 316 Stainless Steel
- Outputs: Analog, Frequency, Switching, Compact Electronics with Digital Displays, Batching and Totalizing Electronics



KOBOLD companies worldwide:

ARGENTINA, AUSTRIA, BELGIUM, BULGARIA, CANADA, CHILE, CHINA, COLOMBIA, CZECH REPUBLIC, EGYPT, FRANCE, GERMANY, GREAT BRITAIN, HUNGARY, INDIA, INDONESIA, ITALY, MALAYSIA, MEXICO, NETHERLANDS, PERU, POLAND, ROMANIA, SINGAPORE, SOUTH KOREA, SPAIN, SWITZERLAND, TAIWAN, THAILAND, TUNISIA, TURKEY, USA, VIETNAM

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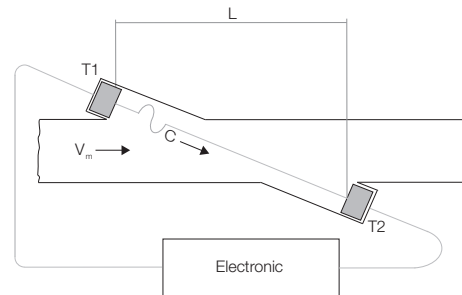


## Compact Ultrasonic Flowmeter Model DUK

### Description

The KOBOLD model DUK flow meters are used for measuring, monitoring, metering, and batching of low viscosity liquids. They are highly repeatable, feature a small pressure loss, and offer measurement independent of density and temperature changes. The devices work on the principle of run time difference. Ultrasonic waves in the media are influenced by the rate of flow. Two sensors mounted opposite one another in the pipeline function simultaneously as transmitter and receiver of the ultrasonic signals. If there is no flow, the run times of both signals are identical. If the media is flowing, then the run time of the signal against the flow is longer than the signal with flow. The run time difference, which is determined by a microprocessor, is proportional to the rate of flow.

The devices can be equipped with a switching output, a frequency output, or an analog output. In addition, a compact electronic can be selected that features a digital display, a switching output, and an analog output. The device series is rounded off by an optionally available batching or totalizing electronic. The meter electronic indicates the momentary flow rate in the first line of the display and the partial or total flow in the second line. A batching electronic controls simple filling tasks and similarly measures flow rates, total amounts, and filling amounts. The analog output and two relay outputs can be used for further processing of the signals. Common applications include: machine building, automotive, robotics, cooling, and hot water.



### Technical Details

<b>Measuring Principle:</b>	Ultrasonic
<b>Range:</b>	See Table
<b>Media:</b>	Water with Max. 1 % Solid
<b>Viscosity:</b>	Max. 3 cSt
<b>Accuracy:</b>	±0.7% of Reading + ±0.7% of F.S.
<b>Repeatability:</b>	±0.1% of F.S.
<b>Mounting Position:</b>	Universal: Flow in Direction of the Arrow (Horizontal: Electronic on Top or Below)
<b>Straight Piping:</b>	10 x Pipe Diameter In/Out

<b>Media Temperature:</b>	4...194 °F -4...248 °F (High Temp Version)
<b>Ambient Temperature:</b>	4...158 °F
<b>Response Time:</b>	Approx. 0.5...1 s (Depending on Electronic Version)
<b>Max Pressure:</b>	230 PSI
<b>Pressure Loss:</b>	Max. 2.2 PSI at F.S.
<b>Protection:</b>	IP 65
<b>Wetted Parts</b>	
<b>Sensor Housing:</b>	Brass or 316 Stainless Steel
<b>Sensors:</b>	PEEK
<b>Seal:</b>	NBR for Standard Version FKM for High Temp Version (Others upon Request)

### Measuring Ranges and Weights

Model	Measuring Range "G" (GPM)	Measuring Range "H" (LPM)	Size (NPT/G)	DUK-...S30x DUK-...F3x0 DUK-...Lx43	DUK-...C3xx	DUK-...Ex4R DUK-...Gx4R	DUK with ADI 24 V <sub>DC</sub>	DUK with ADI 230/115 V <sub>AC</sub>
DUK-xxx4	0.02...5	0.08...20	½	1.87 LB	2.31 LB	2.20 LB	4.74 LB	5.95 LB
DUK-xxx5	0.04...10	0.16...40	¾	2.31 LB	2.76 LB	2.65 LB	5.18 LB	6.39 LB
DUK-xxx6	0.06...16	0.25...63	1	3.20 LB	3.64 LB	3.53 LB	6.06 LB	7.28 LB
DUK-xxx8	0.16...40	0.6...150	1½	5.18 LB	5.62 LB	5.51 LB	8.05 LB	9.26 LB
DUK-xxx9	0.25...65	1...250	2	8.38 LB	8.81 LB	8.71 LB	11.24 LB	12.46 LB
DUK-xxxB	0.6...160	2.5...630	3	15.65 LB	16.09 LB	15.98 LB	18.52 LB	19.73 LB



## Electrical Specifications

### DUK-..S300, DUK-..S30D (Switching Output)

<b>Display:</b>	Bi-color LED for Switch Status
<b>Switching Output (..S300):</b>	SPDT Relay, max. 1 A/30 V <sub>DC</sub>
<b>Switching Output (..S30D):</b>	Active 24 V <sub>DC</sub> , N/C and N/O
<b>Switch Point:</b>	10...90 % of f.s. in 10 % Steps, Configurable by the Customer Using a Rotary Switch
<b>Power Supply:</b>	24 V <sub>DC</sub> ± 20 %
<b>Power Consumption:</b>	30 mA
<b>Electrical Connection:</b>	Plug M 12x1
<b>Max Range Overflow:</b>	Flashing Bi-color LED from 105% of full scale

### DUK-..F300, DUK-..F390 (Frequency Output)

<b>Pulse Output:</b>	PNP, Open Collector, max. 200 mA
<b>Frequency at F.S.:</b>	500 Hz (..F300) 50 to 1000 Hz (..F390) User Specified
<b>Power Supply:</b>	24 V <sub>DC</sub> ± 20 %
<b>Power Consumption:</b>	25 mA
<b>Electrical Connection:</b>	Plug M 12x1
<b>Max Range Overflow:</b>	Frequency output approx 2k from 105% of full scale

### DUK-..L343 (Analog Output)

<b>Analog Output:</b>	4-20 mA, 3-wire
<b>Load:</b>	Max. 500 Ω
<b>Power Supply:</b>	24 V <sub>DC</sub> ± 20 %
<b>Power Consumption:</b>	Max. 45 mA
<b>Electrical Connection:</b>	Plug M 12x1

### DUK-..L443 (Analog Output)

<b>Output:</b>	4 - 20 mA, 3-wire
<b>Load:</b>	Max. 500 Ω
<b>Power Supply:</b>	24 V <sub>DC</sub> ± 20 %
<b>Power Consumption:</b>	Max. 45 mA
<b>Electrical Connection:</b>	Plug DIN 43650

### DUK-..C3xx (Compact Electronic)

<b>Display:</b>	3-digit LED
<b>Analog Output:</b>	4-20 mA Adjustable (only DUK-..C34x)
<b>Load:</b>	Max. 500 Ω
<b>Switching Output:</b>	1(2x) Semiconductor PNP or NPN
<b>Contact Function:</b>	N/C-N/O-Frequency Programmable (Approx. 1400 Hz at F.S., Uncalibrated)
<b>Settings:</b>	Via 2 Buttons
<b>Power Supply:</b>	24 V <sub>DC</sub> ± 20 %
<b>Power Consumption:</b>	Approx. 100 mA
<b>Electrical Connection:</b>	Plug M 12x1

### DUK-..Ex4R (Totalizing Electronic)

<b>Display:</b>	LCD, 2 x 8 Digits, Illuminated Rate, Total and Grand Total, Units Selectable
<b>Analog Output:</b>	4-20 mA Adjustable
<b>Load:</b>	Max. 500 Ω
<b>Switching Output:</b>	Relay (2x), Max. 30 V/2 A, 60 VA
<b>Settings:</b>	Via 4 Buttons
<b>Functions:</b>	Reset, MIN/MAX Memory, Flow Rate, Total and Grand Total, Language
<b>Power Supply:</b>	24 V <sub>DC</sub> ± 20 %, 3-wire
<b>Power Consumption:</b>	Approx. 170 mA
<b>Electrical Connection:</b>	Cable Connection or M12x1 Plug

### DUK-..Gx4R (Batching Electronic)

<b>Display:</b>	LCD, 2 x 8 Digits, Illuminated Batching, Total and Grand Total, Units Selectable
<b>Analog Output:</b>	4-20 mA, Adjustable
<b>Load:</b>	Max. 500 Ω
<b>Switching Output:</b>	Relay (2x), Max. 30 V/2A, 60 VA
<b>Settings:</b>	Via 4 Buttons
<b>Functions:</b>	Batching (Relay S2), Start, Stop, Reset, Fine Batching, Correction Amount, Flow Switch, Total Quantity, Language
<b>Power Supply:</b>	24 V <sub>DC</sub> ± 20 %, 3-wire
<b>Power Consumption:</b>	Approx. 170 mA
<b>Electrical Connection:</b>	Cable Connection or M12 Plug

### DUK-..Kxx2 (ADI-1 Electronic)

<b>Display:</b>	Bar Graph and 5-Digit Digital Combination Display; Batch System
<b>Analog Output:</b>	4-20 mA, 0-10 V
<b>Switching Output:</b>	2x Relays/SPDT Max. 250 V <sub>AC</sub> , 5A Resistive Load Max. 30 V <sub>DC</sub> /5 A
<b>Settings:</b>	Via 4 Buttons
<b>Power Supply:</b>	100-240 V <sub>AC</sub> , ±10% or 18-30 V <sub>AC</sub> /10-40 V <sub>DC</sub>
<b>Electrical Connection:</b>	Terminal Block via Cable Gland



## Compact Ultrasonic Flowmeter Model DUK

**Order Details** (Example: **DUK-11 N4 G S300 L**) Note: Flow range determined by fitting size and can be referenced on the measuring range and weight table located on page 2

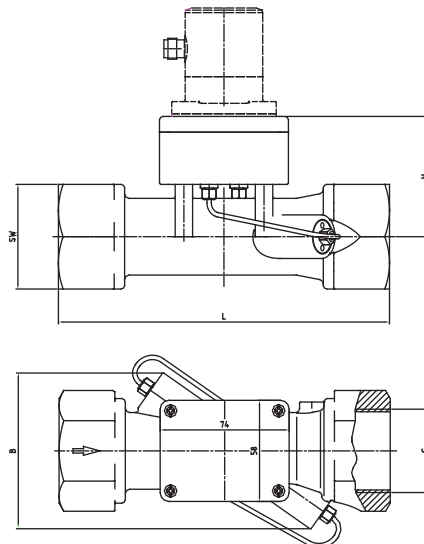
Model / Housing Material	Connection*	Output / Electronic	Flow Direction								
<b>DUK-11..</b> = Brass  <b>DUK-12..</b> = SS  <b>DUK-21..</b> = High Temp. Brass  <b>DUK-22..</b> = High Temp. SS	<b>..N4G..</b> = ½" NPT <b>..N5G..</b> = ¾" NPT <b>..N6G..</b> = 1" NPT <b>..N8G..</b> = 1½" NPT <b>..N9G..</b> = 2" NPT <b>..NBG..</b> = 3" NPT <b>..G4G..</b> = G ½ <b>..G5G..</b> = G ¾ <b>..G6G..</b> = G 1 <b>..G8G..</b> = G 1½ <b>..G9G..</b> = G 2 <b>..GBG..</b> = G 3	<p><b>Switching Output</b>  <b>..S300..</b> = Relay, M12-Plug  <b>..S30D..</b> = Active 24 V<sub>DC</sub>, M12-Plug</p> <p><b>Frequency Output</b>  <b>..F300..</b> = M12-Plug, 500 Hz  <b>..F390..</b> = M12-Plug, 50 to 1000 Hz (User Specified)</p> <p><b>Analog Output</b>  <b>..L343..</b> = M12-Plug, 4-20 mA  <b>..L443..</b> = DIN-Plug, 4-20 mA</p> <p><b>Compact Electronic</b>  <b>..C30R..</b> = Open Collector, PNP (2x)  <b>..C30M..</b> = Open Collector, NPN (2x)  <b>..C34P..</b> = 20 mA, Open Collector, PNP  <b>..C34N..</b> = 4-20 mA, Open Collector, NPN</p> <p><b>ADI Electronic</b></p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 5px 0;"> <thead> <tr> <th style="width: 25%;">Display</th> <th style="width: 25%;">Power Supply</th> <th style="width: 25%;">Output</th> <th style="width: 25%;">Contacts</th> </tr> </thead> <tbody> <tr> <td><b>K</b> = Bar Graph/digital display</td> <td><b>0</b> = 100-230 V<sub>AC/DC</sub> <b>3</b> = 18-30 V<sub>AC</sub> 0-40 V<sub>DC</sub></td> <td><b>0</b> = without <b>4</b> = 4-20 mA, 0-10 VDC</td> <td><b>2</b> = (2x) Relay SPDT</td> </tr> </tbody> </table> <p><b>Totalizing Electronic</b>  <b>..E14R..</b> = LCD, 4-20 mA, Relay (2x), 1 m Cable  <b>..E34R..</b> = LCD, 4-20 mA, Relay (2x), M12-Plug (2x)</p> <p><b>Batching Electronic</b>  <b>..G14R..</b> = LCD, 4-20 mA, Relay (2x), 1 m Cable  <b>..G34R..</b> = LCD, 4-20 mA, Relay (2x), M12-Plug (2x)</p>	Display	Power Supply	Output	Contacts	<b>K</b> = Bar Graph/digital display	<b>0</b> = 100-230 V <sub>AC/DC</sub> <b>3</b> = 18-30 V <sub>AC</sub> 0-40 V <sub>DC</sub>	<b>0</b> = without <b>4</b> = 4-20 mA, 0-10 VDC	<b>2</b> = (2x) Relay SPDT	<p><b>..L</b> = from Left to Right</p> <p><b>..R</b> = from Right to Left</p> <p><b>..T</b> = from Top to Bottom</p> <p><b>..B</b> = from Bottom to Top</p>
Display	Power Supply	Output	Contacts								
<b>K</b> = Bar Graph/digital display	<b>0</b> = 100-230 V <sub>AC/DC</sub> <b>3</b> = 18-30 V <sub>AC</sub> 0-40 V <sub>DC</sub>	<b>0</b> = without <b>4</b> = 4-20 mA, 0-10 VDC	<b>2</b> = (2x) Relay SPDT								

**Accessories:** P/N 807.037 = 4-Pin Micro-DC Connector with 6-foot Cable for Output Types F300, F390, L 343, & S30D  
 P/N 807.007 = 5-Pin Micro-DC Connector with 6-foot Cable for Output Types C3xx, S300, E34R, & G34R  
 P/N 807.087 = 8-Pin Micro-DC Connector with 6-foot Cable for Output Types E34R & G34R

\*Standard display in G/min, optional display L/min (code H instead of G)

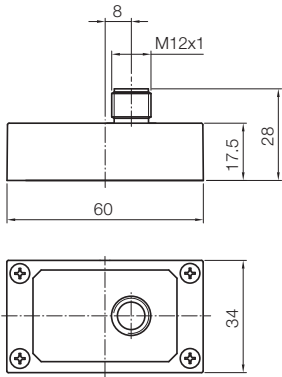
### Dimensions DUK-Sensor

Model	G/NPT	SW (inch)	H (inch)	L (inch)	B (inch)
DUK-xxx4	½	1.18	2.24	4.49	ca.2.83
DUK-xxx5	¾	1.42	2.32	4.98	ca. 2.99
DUK-xxx6	1	1.81	2.48	5.75	ca. 3.15
DUK-xxx8	1½	2.36	2.72	7.48	ca. 3.54
DUK-xxx9	2	2.99	2.91	9.37	ca. 3.82
DUK-xxxB	3	4.13	3.31	12.05	ca. 4.80

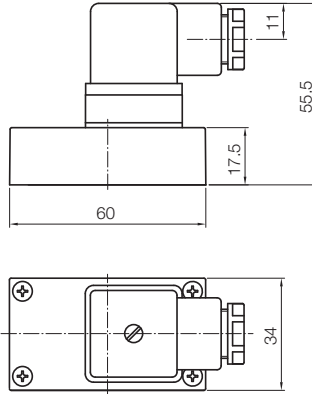


**Dimensions (mm)**

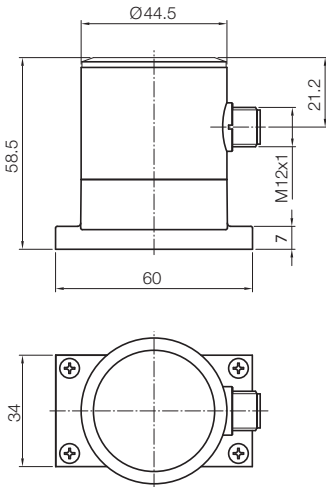
DUK-..S30x, DUK-..F3x0, DUK-..L343



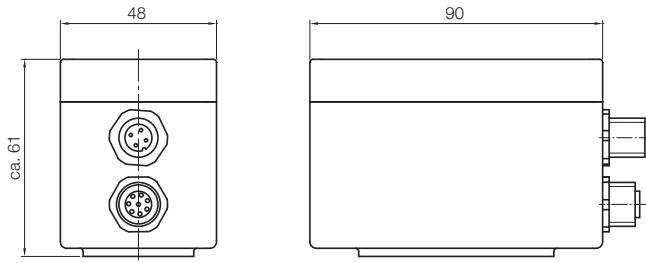
DUK-..L443



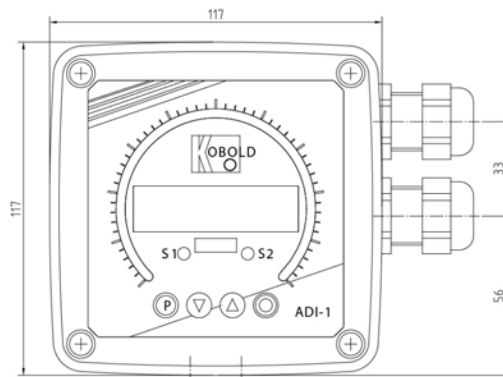
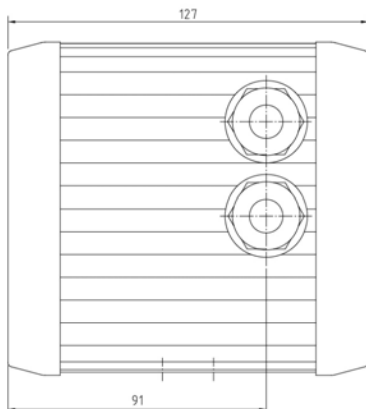
DUK-..C3xx



DUK-..Ex4R, DUK-..Gx4R



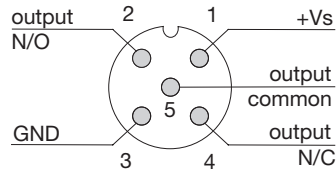
DUK with ADI Electronic



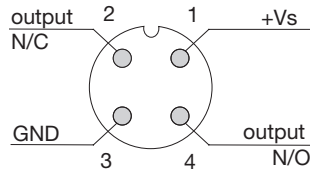


Electrical Connection

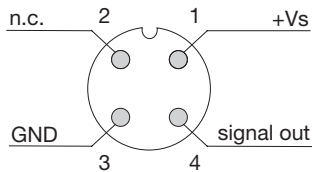
DUK-..S300



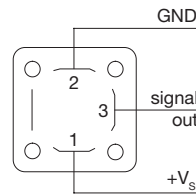
DUK-..S30D



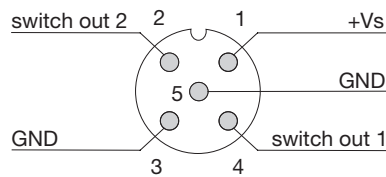
DUK-..F3x0, DUK-..L343



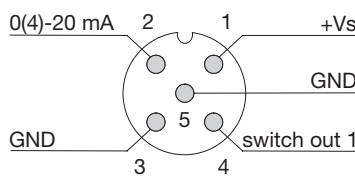
DUK-..L443



DUK-..C30\*



DUK-..C34\*



DUK-...E14R, DUK-...G14R Cable Connection

Wire Number	DUK-..E14R Totalizing Electronic	DUK-..G14R Batching Electronic
1	24 V <sub>DC</sub>	24 V <sub>DC</sub>
2	GND	GND
3	4-20 mA	4-20 mA
4	GND	GND
5	Reset Total Part	Control 1*
6	n. c.	Control 2*
7	Relay S1	Relay S1
8	Relay S1	Relay S1
9	Relay S2	Relay S2
10	Relay S2	Relay S2

\* Control 1 <-> GND: Start-Batching  
 Control 2 <-> GND: Stop-Batching  
 Control 1 <-> Control 2 <-> GND: Reset-Batching

DUK-...E34R, DUK-...G34R Plug Connection

